

DEPARTMENT OF THE NAVY
ATLANTIC DIVISION, NAVAL FACILITIES ENGINEERING COMMAND
NORFOLK, VIRGINIA

N62470-9_-B-_____

NAVFAC
SPECIFICATION
NO. 05-9_-_____

Appropriation:

Project Title
At the
Project Location
(Station Project Number)

DESIGNED BY:

Firm Name
Street Address
City, State Zip
(A/E Contract N62470-___-D-_____)

SPECIFICATION PREPARED BY:

Architectural:
Civil/Structural:
Fire Protection:

Mechanical:
Electrical:

Submitted By:

Date: Month, Day, Year

SPECIFICATION APPROVED BY:

Specification Branch Head: E.J. Gallaher, P.E.
Engineering and Design Director: W.H. Crone, P.E.
For EFD for Commander, NAVFAC:
Date:

SECTION 01140

WORK RESTRICTIONS

09/96

PART 1 GENERAL

1.1 CONTRACTOR USE OF PREMISES

1.1.1 Special Scheduling Requirements

The runway will be closed to air traffic for seven days, beginning on or about March 1, 2000 and reopen seven days thereafter. The Contractor must complete all indicated and specified work during this period. The Contractor may begin indicated work on the shoulders in the parking apron and the arm/de-arm areas prior to the closure of the runway. If work is begun in these areas prior to runway closure, provide traffic control barriers as specified in Section 02220, "Site Demolition." Proceed at the earliest possible and realistic date.

1.1.1.1 Airfield Operation

During the runway closure period the parallel taxiway may be in use.

1.1.1.2 Materials and Equipment

Prior to the runway closing, the Contractor shall assemble materials and equipment. The bituminous asphalt mix design must be approved prior to February 14, 2000. A test strip for demonstrating the effectiveness of asphalt lay down operations shall be performed prior to runway closure. The Contractor may utilize the shoulders in the "Arm/De-Arm Pad" area for the test strip.

1.2 AIRFIELD WORK RESTRICTIONS AND REQUIREMENTS

1.2.1 Emergency Lighting and Signals on Airfield Construction and Elimination of Hazards

The requirement for emergency lighting shall apply to all operations prior to the commencement of the closure period. Prior to the beginning of the closure period, provide and maintain lighting atop all ground equipment, mobile or stationary, within the landing areas of the airdrome, exceeding 4 meters in height. During closure period, emergency lighting is not required.

1.2.2 Marking of Equipment

For operations before the beginning of the closure period, all equipment and materials in the landing area shall be marked with yellow flags by day and red light by night, except where contact light outline the runway, no red lights shall be placed on obstructions outside the contact light area, and except that mobile equipment shall not remain in the landing area at night.

1.2.3 Obstruction of Landing Areas

Prior to the beginning of the closure period, nothing shall be placed upon a landing area without authority of the Officer in Charge. Neither

SECTION 02220

SITE DEMOLITION

12/95

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI A10.6

(1990) Demolition Operations

1.2 GENERAL REQUIREMENTS

Do not begin demolition until authorization is received from the Contracting Officer. Remove rubbish and debris from the station daily ; do not allow accumulations on airfield pavements. Store materials that cannot be removed daily in areas specified by the Contracting Officer.

1.3 SUBMITTALS

Submit the following in accordance with Section 01330, "Submittal Procedures."

1.3.1 SD-08, Statements

a. Demolition plan G

Submit proposed demolition and removal procedures to the Contracting Officer for approval before work is started.

1.3.1.1 Required Data

Demolition plan shall include procedures for coordination with other work in progress, a detailed description of methods and equipment to be used for each operation and of the sequence of operations.

1.4 REGULATORY AND SAFETY REQUIREMENTS

Comply with local hauling and disposal regulations. In addition to the requirements of the "Contract Clauses," safety requirements shall conform with ANSI A10.6.

1.5 DUST AND DEBRIS CONTROL

Prevent the spread of dust and debris on airfield pavements and avoid the creation of a nuisance or hazard in the surrounding area. Do not use water if it results in hazardous or objectionable conditions such as, but not limited to, ice, flooding, or pollution. Vacuum, wet power broom or wet sweep pavements as often as necessary to control the spread of debris that may result in foreign object damage potential to aircraft.

1.6 PROTECTION

1.6.1 Traffic Control Signs

Provide bucket red flashing light barriers, or saw horse type barriers with sand bags and red flashing lights, as directed by the Contracting Officer, whenever working around runways in operation. Refer to the closure information in Section 01140, "Work Restrictions."

1.6.2 Existing Work

Protect existing work which is to remain in place, be reused, or remain the property of the Government. Repair items which are to remain and which are damaged during performance of the work to their original condition, or replace with new. Do not overload pavements to remain. Provide new supports and reinforcement for existing construction weakened by demolition or removal work. Repairs, reinforcement, or structural replacement shall have Contracting Officer approval.

1.7 BURNING

Burning will not be permitted.

1.8 FOREIGN OBJECT DAMAGE (FOD)

Aircraft and aircraft engines are subject to FOD from debris and waste material lying on airfield pavements. Remove all such materials that may appear on operational aircraft pavements due to the Contractor's operations.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

3.1 EXISTING FACILITIES TO BE REMOVED

3.1.1 Utilities and Related Equipment

Remove existing utilities, uncovered by work and terminate in a manner conforming to the nationally recognized code covering the specific utility and approved by the Contracting Officer. If utility lines are encountered that are not shown on drawings, contact the Contracting Officer for further instructions.

3.1.2 Bituminous Concrete Pavement Removal

Mill (cold plane) asphaltic concrete in accordance with Section 02961, "Cold-Milling of Bituminous Pavement".

3.2 DISPOSITION OF MATERIAL

3.2.1 Title to Materials

Except where specified in other sections, all materials and equipment removed, and not reused, shall become the property of the Contractor and shall be removed from Government property. Title to materials resulting from demolition, and materials and equipment to be removed, is vested in the Contractor upon approval by the Contracting Officer of the Contractor's demolition and removal procedures, and authorization by the Contracting

Officer to begin demolition. The Government will not be responsible for the condition or loss of, or damage to, such property after notice to proceed. Materials and equipment shall not be viewed by prospective purchasers or sold on the site.

3.3 CLEANUP

3.3.1 Debris and Rubbish

Remove and transport debris and rubbish from the station and in a manner that will prevent spillage on pavements, streets or adjacent areas. Clean up spillage from pavements, streets and adjacent areas to prevent FOD potential.

-- End of Section --

SECTION 02742

HOT MIX BITUMINOUS PAVEMENT

09/97

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.

ASPHALT INSTITUTE (AI)

AI MS-2 (1993) Mix Design Methods for Asphalt Concrete and Other Hot-Mix Types

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM C 29/C 29M (1991; Rev. A) Unit Weight and Voids in Aggregate

ASTM C 88 (1990) Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate

ASTM C 117 (1995) Materials Finer than 75-Micrometer (No. 200) Sieve in Mineral Aggregates by Washing

ASTM C 127 (1988; R 1993) Specific Gravity and Absorption of Coarse Aggregate

ASTM C 128 (1993) Specific Gravity and Absorption of Fine Aggregate

ASTM C 131 (1996) Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine

ASTM C 136 (1995; Rev. A) Sieve Analysis of Fine and Coarse Aggregates

ASTM C 188 (1989; R 1995) Density of Hydraulic Cement

ASTM D 70 (1982; R 1990) Specific Gravity of Semi-Solid Bituminous Materials

ASTM D 75 (1987; R 1992) Sampling Aggregates

ASTM D 242 (1985; R 1990) Mineral Filler for Bituminous Paving Mixtures

ASTM D 546 (1994) Sieve Analysis of Mineral Filler for Road and Paving Materials

ASTM D 692 (1994; Rev. A) Coarse Aggregate for Bituminous Paving Mixtures

ASTM D 854	(1992) Specific Gravity of Soils
ASTM D 946	(1982; R 1993) Penetration-Graded Asphalt Cement for Use in Pavement Construction
ASTM D 979	(1989) Sampling Bituminous Paving Mixtures
ASTM D 1073	(1994) Fine Aggregate for Bituminous Paving Mixtures
ASTM D 1075	(1994) Effect of Water on Cohesion of Compacted Bituminous Mixtures
ASTM D 1188	(1989) Bulk Specific Gravity and Density of Compacted Bituminous Mixtures Using Paraffin-Coated Specimens
ASTM D 1559	(1989) Resistance to Plastic Flow of Bituminous Mixtures Using Marshall Apparatus
ASTM D 2041	(1994) Theoretical Maximum Specific Gravity and Density of Bituminous Paving Mixtures
ASTM D 2172	(1993) Quantitative Extraction of Bitumen from Bituminous Paving Mixtures
ASTM D 2726	(1993; Rev. A) Bulk Specific Gravity of Compacted Bituminous Mixtures Using Saturated Surface-Dry Specimens
ASTM D 3381	(1992) Viscosity-Graded Asphalt Cement for Use in Pavement Construction
ASTM D 3665	(1994) Random Sampling of Construction Materials
ASTM D 4867M	(1996) Effect of Moisture on Asphalt Concrete Paving Mixtures

1.2 SUBMITTALS

Submit the following in accordance with Section entitled "Submittal Procedures."

1.2.1 SD-05, Design Data

a. Job-mix formula G

Submit a job-mix formula. The asphalt mix shall be composed of a mixture of well-graded aggregate, mineral filler if required, and asphalt material.

The aggregate fractions shall be sized, handled in separate size groups, and combined in such proportions that the resulting mixture meets the grading requirements of the job mix formula (JMF). The mix must be approved prior by placement. If the Tensile Strength Ratio (TSR) of the composite mixture, as determined by ASTM D 4867M is less than 75, the aggregate shall be rejected or the asphalt mixture treated with an approved

anti-stripping agent. The amount of anti-stripping agent added shall be sufficient to produce a TSR of not less than 75. If anti-stripping agent is required, it shall be provided by the Contractor at no additional cost to the Government. Design mix using procedures contained in Chapter III, Marshall Method of Mix Design, of AI MS-2. Formulas shall indicate physical properties of the mixes as shown by tests made by a commercial laboratory approved by the Contracting Officer, using materials identical to those to be provided on this project. Submit formulas with material samples. Job-mix formula for each mixture shall be in effect until modified in writing by the Contractor and approved by the Contracting Officer. Provide a new job-mix formula for each source change.

1.2.1.1 Required Data

Job-mix formula shall show the following:

- a. Source and proportions, percent by weight, of each ingredient of the mixture;
- b. Correct gradation, the percentages passing each size sieve listed in the specifications for the mixture to be used, for the aggregate and mineral filler from each separate source and from each different size to be used in the mixture and for the composite mixture;
- c. Amount of material passing the 75 micrometers sieve determined by dry sieving;
- d. Number of blows of hammer compaction per side of molded specimen;
- e. Temperature viscosity relationship of the asphalt cement;
- f. Stability, flow, percent voids in mineral aggregate, percent air voids, unit weight;
- g. Asphalt absorption by the aggregate;
- h. Effective asphalt content as percent by weight of total mix;
- i. Temperature of the mixture immediately upon completion of mixing;
- j. Asphalt viscosity grade.
- k. Tensile strength ratio (TSR); if required Antistrip agent and amount.
- l. List of asphalt modifiers and amount.

1.2.1.2 Charts

Plot and submit, on a grain size chart, the specified aggregate gradation band, the job-mix gradation and the job-mix tolerance band.

1.2.1.3 Selection of Optimum Asphalt Content

Base selection on percent of total mix and the average of values at the following points on the curves for each mix:

- a. Stability: Peak

- b. Unit Weight: Peak
- c. Percent Air Voids: Median

1.2.2 SD-10, Test Reports

- a. Specific gravity test of asphalt G
- b. Coarse aggregate tests G
- c. Weight of slag test G
- d. Percent of crushed pieces in gravel G
- e. Fine aggregate tests G
- f. Specific gravity of mineral filler G
- g. Bituminous mixture tests G

1.2.3 SD-12, Field Test Reports

- a. Aggregates tests G
- b. Bituminous mix tests G
- c. Pavement courses G

1.3 QUALITY ASSURANCE

1.3.1 Safety Requirements

Provide adequate and safe stairways with handrails to the mixer platform, and safe and protected ladders or other means for accessibility to plant operations. Guard equipment and exposed steam or other high temperature lines or cover with a suitable type of insulation.

1.4 DELIVERY, STORAGE, AND HANDLING

Inspect materials delivered to the site for damage and store with a minimum of handling. Store aggregates in such a manner as to prevent segregation, contamination, or intermixing of the different aggregate sizes.

1.5 ENVIRONMENTAL CONDITIONS

Place bituminous mixture only during dry weather and on dry surfaces. Place courses only when the surface temperature of the underlying course is greater than 10 degrees C.

1.6 CONSTRUCTION EQUIPMENT

Calibrated equipment, such as spreaders and similar equipment, shall have been recalibrated by a calibration laboratory approved by the Contracting Officer within 12 months of commencing work.

1.6.1 Batch Plant

Shall not be permitted on the base.

1.6.2 Paving Equipment

1.6.2.1 Spreading Equipment

Self-propelled electronically controlled type, unless other equipment is authorized by the Contracting Officer. Equip spreading equipment of the self-propelled electronically controlled type with hoppers, tamping or vibrating devices, distributing screws, electronically adjustable screeds, and equalizing devices. Capable of spreading hot bituminous mixtures without tearing, shoving, or gouging and to produce a finished surface of specified grade and smoothness. Operate spreaders, when laying mixture, at variable speeds between 25 and 230 mm per second. Design spreader with a quick and efficient steering device; a forward and reverse traveling speed; and automatic devices to adjust to grade and confine the edges of the mixture to true lines. The use of a spreader that leaves indented areas or other objectionable irregularities in the fresh laid mix during operations is prohibited.

1.6.2.2 Rolling Equipment

Self-propelled pneumatic-tired rollers supplemented by three-wheel and tandem type steel wheel rollers. The number, type and weight of rollers shall be sufficient to compact the mixture to the required density without detrimentally affecting the compacted material. Rollers shall be suitable for rolling hot-mix bituminous pavements and capable of reversing without backlash. Pneumatic-tired rollers shall be capable of being operated both forward and backward without turning on the mat, and without loosening the surface being rolled. Equip rollers with suitable devices and apparatus to keep the rolling surfaces wet and prevent adherence of bituminous mixture. Vibratory rollers especially designed for bituminous concrete compaction may be used provided rollers do not impair stability of pavement structure and underlying layers. Repair depressions in pavement surfaces resulting from use of vibratory rollers. Rollers shall be self-propelled, single or dual vibrating drums, and steel drive wheels, as applicable; equipped with variable amplitude and separate controls for energy and propulsion.

1.6.2.3 Hand Tampers

Minimum weight of 11 kg with a tamping face of not more than 0.032 square meter.

1.6.2.4 Mechanical Hand Tampers

Commercial type, operated by pneumatic pressure or by internal combustion.

PART 2 PRODUCTS

2.1 AGGREGATES

Grade and proportion aggregates and filler so that combined mineral aggregate conforms to specified grading.

2.1.1 Coarse Aggregates

ASTM D 692, except as modified herein. At least 75 percent by weight of aggregate retained on the 4.75 mm sieve shall have two or more fractured faces. Percentage of wear, Los Angeles test, except for slag, shall not exceed 40 in accordance with ASTM C 131. Weight of slag shall not be less

than 1120 kg per cubic meter. Soundness test is required in accordance with ASTM C 88; after 5 cycles, loss shall not be more than 12 percent when tested with sodium sulfate or 18 percent when tested with magnesium sulfate.

2.1.2 Fine Aggregate

ASTM D 1073, except as modified herein. Fine aggregate shall be produced by crushing stone, slag or gravel that meets requirements for wear and soundness specified for coarse aggregate. Where necessary to obtain the gradation of aggregate blend or workability, natural sand may be used. Quantity of natural sand to be added shall be approved by the Contracting Officer and shall not exceed 20 percent of weight of coarse and fine aggregate and material passing the 75 micrometers sieve.

2.1.3 Mineral Filler

Nonplastic material meeting the requirements of ASTM D 242.

2.2 ASPHALT CEMENT

ASTM D 3381, viscosity Grade AC-30, or ASTM D 946 penetration grade 60-70.

2.3 GRADATION OF AGGREGATES

ASTM C 136. Aggregate shall have a gradation within the limits designated in Table I and shall not vary from the low limit on one sieve to the high limit on the adjacent sieve or vice versa, but grade uniformly from coarse to fine. Table I is based on aggregates of uniform specific gravity and the percentages passing the various sieves are subject to appropriate correction when aggregates of varying specific gravities are provided. When materials of different specific gravities are provided, make satisfactory arrangements for separate stock piles, controlled distribution, and other operations necessary to maintain the specific gravity of the mixture constant and uniform. The final lift of the overlay surface shall conform to the wearing course as specified herein.

TABLE I

GRADATION OF AGGREGATES

TOTAL PERCENT PASSING (BY WEIGHT)

Surfacing Course

SIEVE SIZE

19 mm	100
12.5 mm	79-99
9.5 mm	68-88
4.75 mm	48-68
2.36 mm	33-53
1.18 mm	20-40
600 micrometers	14-30
300 micrometers	9-21
150 micrometers	6-16

TABLE I

GRADATION OF AGGREGATES

TOTAL PERCENT PASSING (BY WEIGHT)

	<u>Surfacing Course</u>
75 micrometers	3-6

2.4 Quantity of Bituminous Material

Mix asphalt cement with aggregates of corresponding mixes in the following proportions:

ASPHALT CEMENT PERCENT BY WEIGHT OF TOTAL MIX

Surfacing Course

5.0-7.5

2.5 COMPOSITION OF MIXTURE

Gradation of mineral aggregate shall be as specified herein. The percentage of bituminous material provided in the bituminous mixtures shall be within the limits specified. Mixtures shall have the following physical properties:

<u>Test Property</u>	<u>Values</u>
Number of blows	75
Stability,	Not less than 9556 Newtons
Flow, (.25 mm)	10-14
Percent Air Voids	Not less than 3 nor more than 5
Percent Voids in Mineral Aggregates	13 (minimum) **
TSR, percent	75 (minimum)

** Calculate VMA in accordance with AI MS-2, based on ASTM D 2726 bulk specific gravity for the aggregate.

2.5.1 Index of Retained Strength

ASTM D 1075, 75 or greater.

2.5.2 Recycled Asphalt Material

The bituminous concrete mix may shall not contain any reclaimed asphalt pavement (RAP).

2.6 VARIATIONS FROM FORMULA

Variations from the approved job-mix formula shall not exceed the following, and in no case shall the job-mix formula, with tolerances applied, fall outside the general limits for aggregate gradation and bituminous material specified herein:

<u>Aggregate</u>	<u>Tolerance (Plus or Minus)</u>
12.5 mm and larger	8 percent
9.5 and 4.75 mm	7 percent
2.36 and 1.18 mm	6 percent
600 and 300 micrometers	5 percent
150 micrometers	4 percent
75 micrometers	3 percent
Asphalt Cement	0.3 percent
Temperature of Mixture as discharged	11 degrees C

2.7 SOURCE QUALITY CONTROL

Use materials for testing that are identical to materials to be provided in this project. Employ a commercial laboratory approved by the Contracting Officer to perform testing.

2.7.1 Tests

Perform testing in accordance with the following:

- a. Specific Gravity Test of Asphalt: ASTM D 70
- b. Coarse Aggregate Tests:
 - (1) Bulk Specific Gravity: ASTM C 127
 - (2) Abrasion Loss: ASTM C 131
 - (3) Soundness Loss: ASTM C 88
- c. Weight of Slag Test: ASTM C 29/C 29M
- d. Percent of Crushed Pieces in Gravel: Count by observation and weight
- e. Fine Aggregate Tests:
 - (1) Bulk Specific Gravity: ASTM C 128
 - (2) Soundness Loss: ASTM C 88
- f. Specific Gravity of Mineral Filler: ASTM C 188 or ASTM D 854

g. Bituminous Mixture Tests:

- (1) Bulk Specific Gravity: ASTM D 1188 or ASTM D 2726
- (2) Theoretical Maximum Specific Gravity: ASTM D 2041
- (3) Index of Retained Strength: ASTM D 1075

2.7.2 Specimens

ASTM D 1559 for the making and testing of bituminous specimens with the following exceptions:

- a. Compaction: Apply 75 blows of the hammer to each flat face of the specimens.
- b. Curves: Plot curves for the wearing course to show the effect on the test properties of at least four different percentages of asphalt on the unit weight, stability, flow, air voids, and voids in mineral aggregate; each point on the curves shall represent the average of at least four specimens.
- c. Cooling of Specimen: After compaction is completed, allow the specimen to cool in air to the same temperature approximately as that of the water, 25 degrees C, to be used in the specific gravity determination.

PART 3 EXECUTION

3.1 TEST SECTION

Prior to milling of the existing bituminous surface coarse, the Contractor shall prepare and place a quantity of bituminous mixture according to the job mix formula. The parking apron shoulder may be used as a test section. The equipment used in construction of the test section shall be the same type and weight to be used on the remainder of the course represented by the test section. Three random samples shall be taken at the plant and tested for stability, flow, and air voids. Two random samples of mixture shall be taken at the plant and tested for aggregate gradation and asphalt content. Three randomly selected cores shall be taken from the finished pavement mat, and three from the longitudinal joint. Random sampling shall be in accordance with procedures contained in ASTM D 3665.

Voids in the mineral aggregate (VMA), for each plant sample, shall be computed in accordance with procedures contained in Chapter III, MARSHALL METHOD OF MIX DESIGN, of the Asphalt Institute's Manual Series No. 2 (MS-2), Mix Design Methods for Asphalt Concrete.

The test section shall be considered acceptable if;

- 1) Stability, flow, mat density, air voids, and joint density are 90 percent or more within limits,
- 2) Gradation and asphalt content are within the action limits
- 3) The voids in the mineral aggregate meets specified requirements.

If the initial test section should prove to be unacceptable, the necessary adjustments to the job mix formula, plant operation, placing procedures, and/or rolling procedures shall be made. A second test section shall then be placed. If the second test section also does not meet specification requirements, both sections shall be removed at the Contractor's expense.

Additional test sections, as required, shall be constructed and evaluated for conformance to the specifications. Any additional sections that are not acceptable shall be removed at the Contractor's expense. Full production shall not begin until an acceptable section has been constructed and accepted by the Contracting Officer.

The Contractor shall perform Job mix control testing at the start of plant production and in conjunction with the calibration of the plant for the job mix formula. It should be recognized that the aggregates produced by the plant may not satisfy the gradation requirements or produce a mix that exactly meets the JMF. In those instances, it will be necessary to reevaluate and redesign the mix using plant-produced aggregates. Specimens should be prepared and the optimum bitumen content determined in the same manner as for the original design tests.

3.2 PREPARATION

3.2.1 Mixing

Produce bituminous mixture in a plant as specified herein.

3.2.2 Preparation of Mineral Aggregates

Store different size aggregate in separate stockpiles so that different sizes will not mix. Stockpile different-sized aggregates in uniform layers by use of a clam shell or other approved method so as to prevent segregation. The use of bulldozers in stockpiling of aggregate or in feeding aggregate to the dryer is prohibited. Feed aggregates into the cold elevator by means of separate mechanical feeders so that aggregates are graded within requirements of the job-mix formulas and tolerances specified. Regulate rates of feed of the aggregates so that moisture content and temperature of aggregates are within tolerances specified herein. Dry and heat aggregates to the temperature necessary to achieve the mixture determined by the job mix formula within the job tolerance specified. Provide adequate dry storage for mineral filler.

3.2.3 Transportation of Bituminous Mixtures

Transport bituminous material from the mixing plant to the paving site in trucks having tight, clean, smooth beds that have been coated with a minimum amount of concentrated solution of hydrated lime and water or other approved coating to prevent adhesion of the mixture to the truck. Petroleum products will not be permitted for coating truck. If air temperature is less than 16 degrees C or if haul time is greater than 30 minutes, cover each load with canvas or other approved material of ample size to protect the mixture from the loss of heat. Make deliveries so that the spreading and rolling of all the mixture prepared for one day's run can be completed during daylight, unless adequate approved artificial lighting is provided. Deliver mixture to area to be paved so that the temperature at the time of dumping into the spreader is within the range specified herein. Reject loads that are below minimum temperature, that have crusts of cold unworkable material, or that have been wet excessively by rain. Hauling over freshly laid material is prohibited.

3.2.4 Preparation of Mineral Aggregates

Store different size aggregate in separate stockpiles so that different sizes will not mix. Stockpile different-sized aggregates in uniform layers by use of a clam shell or other approved method so as to prevent

segregation. The use of bulldozers in stockpiling of aggregate or in feeding aggregate to the dryer is prohibited. Feed aggregates into the cold elevator by means of separate mechanical feeders so that aggregates are graded within requirements of the job-mix formulas and tolerances specified. Regulate rates of feed of the aggregates so that moisture content and temperature of aggregates are within tolerances specified herein. Dry and heat aggregates to the temperature necessary to achieve the mixture determined by the job mix formula within the job tolerance specified. Provide adequate dry storage for mineral filler.

3.2.5 Surface Preparation of Underlying Course

Prior to the laying of the asphalt concrete, clean underlying course of foreign or objectionable matter with power blowers or power brooms, supplemented by hand brooms and other cleaning methods where necessary. During the placement of multiple lifts of bituminous concrete, each succeeding lift of bituminous concrete shall have its underlying lift cleaned and provided with a bituminous tack coat if the time period between the placement of each lift of bituminous concrete exceeds 14 days, or the underlying bituminous concrete has become dirty.

3.2.6 Spraying of Contact Surfaces

Spray contact surfaces of previously constructed pavement with a thin coat of bituminous materials to act as an anti-stripping agent, conforming to Section 02744, "Bituminous Tack Coat." Paint contact surfaces of structures with a thin coat of emulsion or other approved bituminous material prior to placing the bituminous mixture. Tack coat the previously placed primed coats on base courses when surface has become excessively dirty and cannot be cleaned or when primed surface has cured to the extent that it has lost all bonding effect.

3.3 PLACEMENT

Place pavement starting at the crown to avoid bonding water at the joint. Feather edging of bituminous concrete is not allowed.

3.3.1 Machine Spreading

The range of temperatures of the mixtures at the time of spreading shall be between 121 degrees C and 149 degrees C. Bituminous concrete having temperatures less than minimum spreading temperature when dumped into the spreader will be rejected. Adjust spreader and regulate speed so that the surface of the course is smooth and continuous without tears and pulling, and of such depth that, when compacted, the surface conforms with the cross section, grade, and contour indicated. Unless otherwise directed, begin the placing along the centerline of areas to be paved on a crowned section or on the high side of areas with a one-way slope. Place mixture in consecutive adjacent strips having a minimum width of 3 m, except where the edge lanes require strips less than 3 m to complete the area. Construct longitudinal joints and edges to true line markings. Establish lines parallel to the centerline of the area to be paved, and place string lines coinciding with the established lines for the spreading machine to follow. Provide the number and location of the lines needed to accomplish proper grade control. When specified grade and smoothness requirements can be met for initial lane construction by use of an approved long ski-type device of not less than 9 m in length and for subsequent lane construction by use of a short ski or shoe, in-place string lines for grade control may be omitted. Place mixture as nearly continuous as possible and adjust the

speed of placing as needed to permit proper rolling.

3.3.2 Shoveling, Raking, and Tamping After Machine-Spreading

Shovelers and rakers shall follow the spreading machine. Add or remove hot mixture and rake the mixture as required to obtain a course that when completed will conform to requirements specified herein. Broadcasting or fanning of mixture over areas being compacted is prohibited. When segregation occurs in the mixture during placing, suspend spreading operation until the cause is determined and corrected. Correct irregularities in alinement left by the spreader by trimming directly behind the machine. Immediately after trimming, compact edges of the course by tamping laterally with a metal lute or by other approved methods. Distortion of the course during tamping is prohibited.

3.3.3 Hand-Spreading in Lieu of Machine-Spreading

In areas where the use of machine spreading is impractical, spread mixture by hand. The range of temperatures of the mixtures when dumped onto the area to be paved shall be between 121 and 149 degrees C. Mixtures having temperatures less than minimum spreading temperature when dumped onto the area to be paved will be rejected. Spread hot mixture with rakes in a uniformly loose layer of a thickness that, when compacted, will conform to the required grade, thickness, and smoothness. During hand spreading, place each shovelful of mixture by turning the shovel over in a manner that will prevent segregation. Do not place mixture by throwing or broadcasting from a shovel. Do not dump loads any faster than can be properly handled by the shovelers and rakers.

3.4 COMPACTION OF MIXTURE

Compact mixture by rolling. Begin rolling as soon as placement of mixture will bear rollers. Delays in rolling freshly spread mixture shall not be permitted. Start rolling longitudinally at the extreme sides of the lanes and proceed toward center of pavement, or toward high side of pavement with a one-way slope. Operate rollers so that each trip overlaps the previous adjacent strip by at least 300 mm. Alternate trips of the roller shall be of slightly different lengths. Conduct tests for conformity with the specified crown, grade and smoothness immediately after initial rolling. Before continuing rolling, correct variations by removing or adding materials as necessary. If required, subject course to diagonal rolling with the steel wheeled roller crossing the lines of the previous rolling while mixture is hot and in a compactible condition. Speed of the rollers shall be slow enough to avoid displacement of hot mixture. Correct displacement of mixture immediately by use of rakes and fresh mixture, or remove and replace mixture as directed. Continue rolling until roller marks are eliminated and course has a density of at least 97 percent but not more than 101 percent of that attained in a laboratory specimen of the same mixture prepared in accordance with ASTM D 1559. During rolling, moisten wheels of the rollers enough to prevent adhesion of mixture to wheels, but excessive water is prohibited. Operation of rollers shall be by competent and experienced operators. Provide sufficient rollers for each spreading machine in operation on the job and to handle plant output. In places not accessible to the rollers, compact mixture thoroughly with hot hand tampers. Skin patching of an area after compaction is prohibited.

Remove mixture that becomes mixed with foreign materials or is defective and replace with fresh mixture compacted to the density specified herein. Roller shall pass over unprotected edge of the course only when laying of course is to be discontinued for such length of time as to permit mixture

to become cold.

3.5 JOINTS

Joints shall present the same texture and smoothness as other portions of the course, except permissible density at the joint may be up to 2 percent less than the specified course density. Carefully make joints between old and new pavement in a manner to ensure a thorough and continuous bond between old and new sections of the course. Vertical contact surfaces of previously constructed sections that are coated with dust, sand, or other objectionable material shall be painted with a thin uniform coat of emulsion or other approved bituminous material just before placing fresh mixture.

3.5.1 Transverse

Roller shall pass over unprotected end of freshly laid mixture only when laying of course is to be discontinued. Except when an approved bulkhead is used, cut back the edge of previously laid course to expose an even, vertical surface for the full thickness of the course. When required, rake fresh mixture against joints, thoroughly tamp with hot tampers, smooth with hot smoothers, and roll. Transverse joints in adjacent lanes shall be offset a minimum of 600 mm.

3.5.2 Longitudinal Joints

Do not allow joints to coincide with joints of existing pavement or previously placed courses by spacing 150 mm minimum apart. When placing new bituminous concrete next to lanes having a cold joint, cut back the cold joint 75 mm to produce a smooth, uniform, and compact edge to place new bituminous concrete against. Spreader screed shall overlap previously placed lanes 50 to 75 mm and be of such height to permit compaction to produce a smooth dense joint. With a lute, push back mixture placed on the surface of previous lanes to the joint edge. Do not scatter mix. Remove and waste excess material. When edges of longitudinal joints are irregular, honeycombed, or poorly compacted, cut back unsatisfactory sections of joint and expose an even vertical surface for the full thickness of the course. When required, rake fresh mixture against joint, thoroughly tamp with hot tampers, smooth with hot smoothers, and roll while hot.

3.6 FIELD QUALITY CONTROL

Sampling and testing requirements shall apply for the test strip and airfield surfacing course.

3.6.1 Sampling

3.6.1.1 Aggregates At Source

Prior to production and delivery of aggregates, take at least one initial sample in accordance with ASTM D 75 from each stockpile. Collect each sample by taking three incremental samples at random from the source material to make a composite sample of not less than 22 kg. Repeat the sampling when the material source changes or when testing reveals unacceptable deficiencies or variations from the specified grading of materials.

3.6.1.2 Cold Feed Aggregate Sampling

Take two samples daily from the belt conveying materials from the cold feed.

Collect materials in three increments at random to make a representative composite sample of not less than 22 kg. Take samples in accordance with ASTM D 75.

3.6.1.3 Coarse and Fine Aggregates

Take a 22 kg sample from the cold feed at least once daily for sieve analyses and specific gravity tests. Additional samples may be required to perform more frequent tests when analyses show deficiencies, or unacceptable variances or deviations. The method of sampling is as specified herein for aggregates.

3.6.1.4 Mineral Filler

ASTM D 546. Take samples large enough to provide ample material for testing.

3.6.1.5 Pavement and Mixture

Take plant samples for the determination of mix properties and field samples for thickness and density of the completed pavements. Furnish tools, labor and material for samples, and satisfactory replacement of pavement. Take samples and tests at not less than frequency specified hereinafter and at the beginning of plant operations; for each day's work as a minimum; each change in the mix or equipment; and as often as directed. Accomplish sampling in accordance with ASTM D 979.

3.6.2 Testing

3.6.2.1 Aggregates Tests

- a. Gradation: ASTM C 136.
- b. Mineral Filler Content: ASTM D 546.
- c. Abrasion: ASTM C 131 for wear (Los Angeles test). Perform one test initially prior to incorporation into the work and each time the source is changed.

3.6.2.2 Bituminous Mix Tests

Test one sample for each 455 metric tons, or fraction thereof, of the uncompacted mix for extraction in accordance with ASTM D 2172; perform a sieve analysis on each extraction sample in accordance with ASTM C 136 and ASTM C 117. Test one sample for each 455 metric tons or fraction thereof for stability and flow in accordance with ASTM D 1559. Test one sample for each material blend for index of retained strength in accordance with ASTM D 1075.

3.6.2.3 Pavement Courses

Perform the following tests:

- a. Density: For each 910 metric tons of bituminous mixture placed, determine the representative laboratory density by averaging the density of four laboratory specimens prepared in accordance with ASTM D 1559. Samples for laboratory specimens shall be taken from

trucks delivering mixture to the site; record in a manner approved by the Contracting Officer the project areas represented by the laboratory densities. From each representative area recorded, determine field density of pavement by averaging densities of 100 mm diameter cores obtained from wearing course; take one core for each 1672 square meters or fraction thereof of course placed. Determine density of laboratory prepared specimens and cored samples in accordance with ASTM D 1188 or ASTM D 2726, as applicable. Separate pavement layers by sawing or other approved means. Maximum allowable deficiency at any point, excluding joints, shall not be more than 2 percent less than the specified density for any course. The average density of each course, excluding joints, shall be not less than the specified density. Joint densities shall not be more than 2 percent less than specified course densities and are not included when calculating average course densities. When the deficiency exceeds the specified tolerances, correct each such representative area or areas by removing the deficient pavement and replacing with new pavement.

- b. Thickness: Determine thickness of the wearing course from samples taken for the field density test. The maximum allowable deficiency at any point shall not be more than 6 mm less than the thickness for the indicated course. Average thickness of course or of combined courses shall be not less than the indicated thickness. Where a deficiency exceeds the specified tolerances, correct each such representative area or areas by removing the deficient pavement and replacing with new pavement.
- c. Smoothness: Straightedge test the compacted surface of the wearing course as work progresses. Apply straightedge parallel with and at right angles to the centerline after final rolling. Variations in the wearing course shall not vary more than 3 mm in 3 m. Correct each portion of the pavement showing irregularities greater than that specified.
- d. Finished Grades: Finish grades of each course placed shall not vary from the finish elevations, profiles, and cross sections indicated by more than 13 mm. Finished surface of the final wearing course will be tested by running lines of levels at intervals of 8 m longitudinally and transversely to determine elevations of completed pavement. Within 45 days after completion of final placement, perform a level survey at the specified grid spacing and plot the results on a plan drawn to the same scale as the drawings. Elevations not in conformance with the specified tolerance shall be noted on the plan in an approved manner. The survey shall be performed by a registered land surveyor. The Contracting Officer will inform the Contractor in writing of paved areas that fail to meet the final grades indicated within the specified tolerances. Correct deficient paved areas by removing existing work and replacing with new materials that meet the specifications. Skin patching for correcting low areas is prohibited.
- e. Finish Surface Texture of Wearing Course: Visually check final surface texture for uniformity and reasonable compactness and tightness. Final wearing course with a surface texture having undesirable irregularities such as segregation, cavities, pulls or tears, checking, excessive exposure of coarse aggregates, sand

streaks, indentations, ripples, or lack of uniformity shall be removed and replaced with new materials.

3.7 PROTECTION

Do not permit vehicular and aircraft traffic, including heavy equipment, on pavement until surface temperature has cooled to at least 50 degrees C. Measure surface temperature by approved surface thermometers or other satisfactory methods.

-- End of Section --

SECTION 02744

BITUMINOUS TACK COAT

03/96

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.

AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS
(AASHTO)

AASHTO T102 (1983; R 1993) Spot Test of Asphaltic
Materials

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM D 140 (1993) Sampling Bituminous Materials

ASTM D 977 (1991) Emulsified Asphalt

1.2 SUBMITTALS

Submit the following in accordance with Section entitled "Submittal Procedures."

1.2.1 SD-10, Test Reports

a. Certified test reports: For emulsified asphalt G

1.3 DELIVERY AND STORAGE

Inspect the materials delivered to the site for contamination and damage. Unload and store the materials with a minimum of handling.

1.4 WEATHER LIMITATIONS

Apply the tack coat only when the surface is dry. Apply the tack coat only when the ambient temperature is 10 degrees C or above and when the temperature has not been below 1.7 degrees C for 12 hours immediately prior to application, unless otherwise directed.

PART 2 PRODUCTS

2.1 MATERIALS

Bituminous material for the tack coat shall be emulsified asphalt.

2.1.1 Emulsified Asphalt

ASTM D 977, Type RS-1. The base asphalt used to manufacture the emulsion shall show a negative spot when tested in accordance with AASHTO T102 using standard naphtha.

2.2 CONSTRUCTION EQUIPMENT

Provide equipment dependable and adequate for the purpose intended and properly maintained in satisfactory and safe operating condition. Calibrated equipment such as asphalt distributors, scales, batching equipment, spreaders and similar equipment, shall have been recalibrated by a calibration laboratory within 12 months prior to commencing work.

2.2.1 Bituminous Distributor

The bituminous distributor shall be designed and equipped to distribute the bituminous material uniformly at even heat on variable widths of surface at readily determined and controlled rates from 0.23 to 9.05 liters per square meter, with a pressure range of 172.4 to 517.1 kPa and with an allowable variation not to exceed 5 percent from any specified rate. Distributor equipment shall include a separate power unit for the bitumen pump, full-circulation spray bars, tachometer, pressure gages, volume-measuring devices, adequate heaters for heating the materials to the proper application temperature, a thermometer for reading the temperature of the tank contents, and a hose and spray nozzle attachment suitable for applying bituminous material to spots unavoidably missed by the distributor and to areas inaccessible to the distributor. The distributor shall be equipped to circulate and agitate the bituminous material during the heating process.

2.2.2 Heating Equipment for Storage Tanks

The equipment for heating the bituminous material shall be steam, electric, or hot oil heaters. Steam heaters shall consist of steam coils and equipment for producing steam, so designed that the steam cannot get into the material. An armored thermometer with a temperature range from 4.4 to 204.4 degrees C shall be fixed to the tank so that the temperature of the bituminous material may be determined at all times.

2.2.3 Brooms and Blowers

Brooms and blowers shall be of the power type suitable for cleaning the surfaces for application of the bituminous material.

PART 3 EXECUTION

3.1 PREPARATION OF SURFACE

Immediately before applying the tack coat, remove loose material, dirt, clay, and other objectionable material from the surface to be treated by a power broom or blower supplemented with hand brooms. After the cleaning operation and prior to the application of the tack coat, inspect the area to be paved to determine the fitness of the area to receive the bituminous material.

3.2 APPLICATION OF BITUMINOUS MATERIAL

Apply the tack coat when the surface to be treated is dry. Immediately following the preparation of the surface for treatment, apply the bituminous material by means of the bituminous distributor, within the limits of temperature specified herein and at a rate of not less than 0.23 liter nor more than 0.68 liter of diluted emulsion per square meter. Apply the bituminous material so that uniform distribution is obtained over the entire surface to be treated. Treat lightly coated areas and spots missed by the distributor with the bituminous material. Following the

application of bituminous material, allow the surface to cure without being disturbed for period of time necessary to permit setting of the tack coat. Apply the bituminous tack coat only as far in advance of the placing of the overlying layer as required for that day's operation. Maintain and protect the treated surface from damage until the succeeding course of pavement is placed.

3.2.1 Application Temperature for Emulsified Asphalt

Between 23.9 and 54.4 degrees C.

3.3 FIELD SAMPLING AND TESTING

3.3.1 Sampling Bituminous Materials

Furnish samples of bituminous materials for testing. Test in accordance with ASTM D 140.

3.3.2 Bituminous Material Tests

Perform spot test for asphalt in accordance with AASHTO T102 on each shipment.

3.4 TRAFFIC CONTROLS

Keep traffic off surfaces freshly treated with bituminous material. Provide sufficient warning signs and barricades so that traffic will not travel over freshly treated surfaces.

-- End of Section --

SECTION 02761

PAVEMENT MARKINGS

09/97

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.

FEDERAL SPECIFICATIONS (FS)

FS TT-B-1325	(Rev. C) Beads (Glass Spheres) Retro-Reflective
FS TT-P-1952	(Rev. D) Paint, Traffic and Airfield Markings, Water Emulsion Base

1.2 SUBMITTALS

Submit the following in accordance with Section entitled "Submittal Procedures."

1.2.1 SD-02, Manufacturer's Catalog Data

- a. Reflective media for airfields G
- b. Paints for airfields G

1.2.2 SD-13 Certificates

- a. Reflective media for airfields G
- c. Paints for airfields G

1.3 DELIVERY AND STORAGE

Deliver paints and paint materials in original sealed containers that plainly show the designated name, specification number, batch number, color, date of manufacture, manufacturer's directions, and name of manufacturer. Provide storage facilities at the job site for maintaining materials at temperatures recommended by the manufacturer. Make available paint stored at the project site or segregated at the source for sampling not less than 30 days prior to date of required approval for use to allow sufficient time for testing. Notify the Contracting Officer when paint is available for sampling.

1.4 WEATHER LIMITATIONS

Apply paint to clean, dry surfaces, and unless otherwise approved, only when air and pavement temperatures are above 5 degrees C for oil-based materials, 10 degrees C for water-based materials, and less than 35 degrees C. Maintain paint temperature within these same limits.

PART 2 PRODUCTS

2.1 EQUIPMENT

Machines, tools, and equipment used in the performance of the work shall be approved by the Contracting Officer and maintained in satisfactory operating condition. Submit construction equipment list approval by the Contracting Officer.

2.1.1 Paint Applicator

The equipment for applying the paint for airfield pavements will be a self-propelled or mobile-drawn pneumatic spraying machine with an arrangement of atomizing nozzles capable of applying a width of line at any one time in multiples of 150 mm , from 150 to 900 mm . Provide paint applicator with paint reservoirs or tanks of sufficient capacity and suitable gages to apply paint in accordance with requirements specified. Equip tanks with suitable air-driven mechanical agitators. Equip spray mechanism with quick-action valves conveniently located, and include necessary pressure regulators and gages in full view and reach of the operator. Install paint strainers in paint supply lines to ensure freedom from residue and foreign matter that may cause malfunction of the spray guns. The paint applicator shall be readily adaptable for attachment of an air-actuated dispenser for the reflective media approved for use. Provide pneumatic spray guns for hand application of paint in areas where the mobile paint applicator cannot be used.

2.1.2 Reflective Media Dispenser

Attach dispenser for applying the reflective media to the paint dispenser and operate automatically and simultaneously with the paint applicator through the same control mechanism. Use dispenser capable of adjustment and designed to provide uniform flow of reflective media over the full width of the stripe at the rate of coverage specified herein at all operating speeds of the paint applicator to which it is attached.

2.2 MATERIALS

Provide materials conforming to the requirements specified herein.

2.2.1 Paints for Airfields

FS TT-P-1952, color as indicated.

2.2.2 Reflective Media for Airfields

FS TT-B-1325, Type III, Gradation A.

PART 3 EXECUTION

3.1 SURFACE PREPARATION

Allow new pavement surfaces to cure for a period of not less than 7 days before application of marking materials, except pavement constructed within seven days of the expiration of the airfield closure period shall cure for a period of not less than three days prior to application of marking materials. Thoroughly clean surfaces to be marked before application of the paint. Remove dust, dirt, and other granular surface deposits by sweeping, blowing with compressed air, rinsing with water, or a combination of these methods as required. Remove residual curing compounds, and other

coatings adhering to the pavement by water blasting. Scrub affected areas, where oil or grease is present on old pavements to be marked, with several applications of trisodium phosphate solution or other approved detergent or degreaser and rinse thoroughly after each application. After cleaning oil-soaked areas, seal with shellac or primer recommended by the manufacturer to prevent bleeding through the new paint. Do not commence painting in any area until pavement surfaces are dry and clean.

3.2 APPLICATION

3.2.1 Rate of Application

3.2.1.1 Reflective Markings

Apply paint evenly to the pavement area to be coated at a rate of 2.5 plus or minus 0.10 square meter per liter. Apply glass spheres uniformly to the wet paint on airfield pavement at a rate of (1198) plus or minus (60) kg of glass spheres per cubic meter.

3.2.2 Painting

Apply paint pneumatically with approved equipment at rate of coverage specified herein. Provide guidelines and templates as necessary to control paint application. Take special precautions in marking numbers, letters, and symbols. Manually paint numbers, letters, and symbols. Sharply outline all edges of markings. The maximum drying time requirements of the paint specifications will be strictly enforced, to prevent undue softening of bitumen, and pickup, displacement, or discoloration by tires of traffic. Discontinue painting operations if there is a deficiency in drying of the markings until cause of the slow drying is determined and corrected.

3.2.3 Reflective Media

Application of reflective media shall immediately follow the application of paint. Accomplish drop-on application of the glass spheres to ensure even distribution at the specified rate of coverage. Should there be malfunction of either paint applicator or reflective media dispenser, discontinue operations until deficiency is corrected.

3.3 FIELD TESTING AND INSPECTION

3.3.1 Sampling and Testing

As soon as the paint and reflective materials are available for sampling, obtain by random selection from the sealed containers, two quart samples of each batch in the presence of the Contracting Officer. Accomplish adequate mixing prior to sampling to ensure a uniform, representative sample. A batch is defined as that quantity of material processed by the manufacturer at one time and identified by number on the label. Clearly identify samples by designated name, specification number, batch number, project contract number, intended use, and quantity involved. At the discretion of the Contracting Officer, additional samples provided may be tested by the Government for verification.

3.3.2 Inspection

Examine material at the job site to determine that it is the material referenced in the report of test results or certificate of compliance. A certificate of compliance shall be accompanied by test results

substantiating conformance to the specified requirements.

3.3.2.1 Surface Preparations and Application Procedures

Surface preparations and application procedures will be examined by the Contracting Officer to determine conformance with the requirements specified. Approve each separate operation prior to initiation of subsequent operations.

3.4 TRAFFIC CONTROL AND PROTECTION

Place warning signs near the beginning of the work site and well ahead of the work site for alerting approaching traffic from both directions. Place small markers along newly painted lines to control traffic and prevent damage to newly painted surfaces. Mark painting equipment with large warning signs indicating slow-moving painting equipment in operation.

-- End of Section --

SECTION 02786

FOG SEAL

09/98

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM D 2397	(1994) Cationic Emulsified Asphalt
ASTM D 2995	(1993) Determining Application Rate of Bituminous Distributors

DEPARTMENT OF TRANSPORTATION (DOT)

DOT D-6.1	(1989) Uniform Traffic Control Devices for Streets and Highways
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1.2 SUBMITTALS

Submit the following in accordance with Section 01330, "Submittal Procedures."

1.2.1 SD-10 Test Reports

a. Emulsified asphalt G

Perform all tests in referenced publication no more than 30 days prior to submittal.

1.2.2 SD-17 Sample Instructions

a. Fog seal G

Submit in accordance with paragraph entitled "Sample Application," for approval and selection of one of the trial application rates.

1.2.3 SD-18 Records

a. Weather inspection reports G

1.3 DELIVERY, STORAGE, AND HANDLING

Deliver emulsified asphalt to the site in a homogenous and undamaged condition. Protect the materials against damage. Replace defective or damaged materials.

1.4 TRAFFIC CONTROL

Keep all traffic off freshly treated surfaces for at least 2 hours. Provide warning signs and barricades for proper traffic control, in

accordance with DOT D-6.1.

1.5 CONSTRUCTION EQUIPMENT

Maintain equipment in proper condition during the performance of the work. Calibrate equipment, such as bituminous distributors, scales, and similar equipment, using an approved calibration laboratory no more than 12 months before commencing work.

1.5.1 Bituminous Distributor

The distributor shall be capable of distributing emulsified asphalt uniformly at even heat at variable widths of surface at controlled rates from 0.23 to 9.0 liters per square meter, with pressure range of 172 to 517 kPa and with a capability to vary from any specified rate not exceeding 5 percent for the job. Provide distributor with an adjustable, both horizontally and vertically, spray nozzle bar. Make normal width of spray bar application at least 3.7 m, with provision for lesser or wider width when necessary. Provide a hose and spray nozzle attachment for applying material to patches and areas inaccessible to spray bar. Provide distributor with positive shutoff control. Provide a power-driven pump. Equip pump with a tachometer having a dial registering liters per second passing through nozzles. Equip distributor with a meter having a dial registering meters of travel per second. Make both dials visible to the distributor driver. Provide distributor with heating attachments, and circulate asphaltic emulsion during entire heating process. Equip distributor with a full circulatory system that includes the spray bar. Provide a thermometer and well, not in contact with any heating tubes, for accurately indicating temperature of asphaltic emulsion.

1.5.2 Power Brooms and Power Blowers

Suitable for cleaning the surfaces to which the fog seal coat is to be applied.

1.5.3 Vacuum Sweepers

Self-propelled, vacuum pickup sweeper capable of removing loose sand, water, and debris from pavement surface.

PART 2 PRODUCTS

2.1 EMULSIFIED ASPHALT

ASTM D 2397 CRS-2.

2.2 WATER

Water shall be fresh, clean, and potable.

PART 3 EXECUTION

3.1 FIELD INSPECTION

3.1.1 Site Preparation Inspection

Immediately before applying fog seal to the pavement, inspect surface to assure preparation as specified.

3.1.2 Equipment Inspection

Inspect all equipment prior to application of fog seal. Furnish such equipment and materials and perform work to calibrate tank and measuring devices of the distributor. Perform inspection and calibration at the beginning of the work and at least once a day during construction.

3.1.3 Application Inspection

Inspect application of fog seal. Inspect for uniform application. During application, take one sample for each 400 square meters of surface area to receive emulsified asphalt. Weigh samples to determine conformance with application rate.

3.1.4 Inspection Reports

Furnish a written report citing climatic temperature during application, emulsion temperature during application, and rate of emulsion application.

3.2 PREPARATION OF SURFACE

Clean the surface to receive the fog seal. Remove dirt, clay, vegetation, loose and flaking paint, or other objectionable material by means of power brooms, power blower, or other approved equipment. When necessary to achieve a clean surface, flushing with water will be permitted.

3.3 APPLICATION

3.3.1 Environmental Conditions

Apply fog seal only when existing surface is dry and there is no threat of rain. Apply fog seal when atmospheric temperature is above 10 degrees C and rising or when pavement temperature is above 15.6 degrees C, unless otherwise directed.

3.3.2 Distributor Calibration

The bituminous distributor shall be calibrated in accordance with ASTM D 2995.

3.3.3 Sample Application

Determine the required application rate from a sample installation. Select an area of the prepared pavement at least 100 meters long and as wide as the distributor spray bar. Dilute emulsified asphalt with an equal part of water. Apply the water diluted asphalt emulsion in at least three test sections; each a minimum of 30 m. The trial applications shall be made at the rates of 0.63 liters per square meter. The trial application rates may be modified if approved by the Contracting Officer. Additional trial applications may be made if warranted by pavement surface conditions. The rate which has been satisfactorily applied without leaving an excess of asphalt residue on the surface and has been approved, shall be used for the fog seal.

3.3.4 Application

Following preparation of the surface, apply the water diluted asphalt emulsion at the rate determined from the trial application. Maintain application temperature of emulsified asphalt between 24 degrees and 71

degrees C. To obtain uniform application of the fog seal at the junction of previous and subsequent applications, spread building paper on the surface of the applied material for a sufficient distance back from the ends of each application so that flow from the spray bar may be started and stopped on the paper, and so that all sprayers will operate at full force. Immediately after application, remove and properly dispose of the building paper. Treat spots unavoidably missed with the hand spray equipment. Base bids on application of 0.63 liters per square meter. If the actual amount required is more or less than 0.63 L/square meter, an adjustment in the contract price will be made as provided by the contract.

3.3.5 Protection of Site Facilities

During applications, protect adjacent buildings, structures, vehicles, manhole covers, inlet grates, and trees to prevent being spattered or marred.

-- End of Section --

SECTION 02961

COLD-MILLING OF BITUMINOUS PAVEMENT

03/98

PART 1 GENERAL

1.1 REFERENCE

The publication listed below forms a part of this specification to the extent referenced. The publication is referred to in the text by the basic designation only.

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM C 136 (1996; Rev. A) Sieve Analysis of Fine and Coarse Aggregates

1.2 COORDINATION

Work performed under this section shall be coordinated with, and approved by the Contracting Officer. A minimum of seven days notice is required prior to start of milling work to minimize impact on activity operations.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

3.1 SURFACE PREPARATION

Clean the pavement surface of excessive dirt, clay or other foreign matter with power brooms and hand brooms immediately prior to the milling operation.

3.2 COLD-MILLING OPERATION

Remove old pavement by cold milling. Ensure that only bituminous pavement is removed and the base course is not disturbed. Make sufficient passes so that the designated area is milled to the grades and cross sections indicated. The milling shall proceed with care so as not to damage the pavement below the designated grade. Repair or replace damaged manholes, valve boxes, utility lines, or pavement that is torn, cracked, gouged, rutted, broken or undercut. The milled material shall be removed from the pavement and loaded into trucks.

3.3 FIELD QUALITY CONTROL

3.3.1 Grade-Conforming Tests

Test the finished milled surface of the pavement for conformance with the plan-grade requirements and test for acceptance by running lines of levels at intervals of 7.5 m longitudinally and 7.5 m transversely to determine the elevation of the completed pavement. The finished milled-pavement surfaces shall vary not more than 6 mm from the established plan grade line and elevation and the milled surface shall not be less than 50 mm below the finished grade indicated. Correct variations from the designated gradeline

and elevation in excess of the plan-grade requirements, as directed. Remove and replace deficient low areas. Skin patching for correcting low areas is not permitted unless approved by the Contracting Officer. Correct low areas by removing sufficient material to allow at least 50 mm of bituminous concrete surface course material to be placed.

3.4 REMOVAL OF MILLED MATERIAL

Material that is removed shall become the property of the contractor and removed from the station.

-- End of Section --

equipment nor personnel shall use any runway for any purpose unless the runway is closed by order of the Officer in Charge and marked as specified above.

1.2.4 Notification

The Contractor shall report to the Officer in Charge before initiating any work and shall notify the Officer in Charge of proposed changes of locations of operations. Additional permission must, in each and every instance, be obtained before entering a landing area with automotive equipment, trunks, trenchers, cranes, or similar equipment.

1.2.5 Officer in Charge

As used herein, the "Officer in Charge" means the Station Air Operation's Officer or his designee. Initial contact and continuing relationships between the Officer in Charge and the Contractor will be coordinated by the Contracting Officer.

1.2.6 Access to the Construction Site

Access to the construction site shall be only as directed by the Contracting Officer. The Contractor shall be at all times refrain from the use of any roads, grounds and other facilities which have not been specifically authorized for his use. Roads and access used by the contractor during the performance of the work shall be maintained by him in good condition at all times, and shall be left in a condition satisfactory to the Contracting Officer, upon completion of the work.

1.2.7 Radio Contact

The Contractor shall provide the necessary battery powered portable radios, including one radio for the tower, and shall have a man, who fluently speaks English, available for radio contact with the Tower at all times during work within the landing area.

1.2.8 Equipment Storage

All Contractor equipment not in use, or during non-working hours, shall be parked in an area designated by the Contracting Officer. When working before the beginning of the closure period, the equipment shall be packed at the Contractor lay down area. During the closure period the equipment may be parked on the airfield.

1.2.9 Emergency Removal of Equipment

The Contractor may be directed by the tower or the Contracting Officer to either lower his equipment or remove his equipment from the landing area, during an emergency situation.

1.2.10 Work Area Conditions

Before the beginning of the closure period, aircraft will fly over runway in the work area. Extreme care must be exercised, particularly with loose equipment and small objects, due to high wind conditions created by aircraft during takeoff and landing operations.

1.2.11 Noise and Vibration Protection

The Contractor is advised that aircraft operations will produce extremely high noise levels and will induce vibrations in pavements, structures, and equipment in the vicinity, and may result in high velocity flying debris in the area. The contractor shall be responsible for providing all necessary ear protective and other safety devices for his personnel, for insuring protection of his equipment, and for scheduling the work to eliminate hazards to his personnel and equipment and to prevent damage to work performed by him.

1.2.12 Maintaining Pavements Clean

Existing airfield pavement, including runways, taxiways, holds areas and parking aprons, where the Contractor's equipment and operations are permitted, shall be kept clean at all times of all dirt, gravel, aggregates, and other materials deemed by the Contracting Officer to be detrimental to the existing pavement or to aircraft. Precautions shall be taken to eliminate spillage of materials, movement of materials by wind and rain, spray of materials from demolition work, and other activities that will leave loose material on pavements. Loose material shall be picked up immediately, stored securely, and completely removed at the end of each work shift. Haul routes over airfield pavements shall be vacuumed and haul routes over other paved surfaces shall be broomed on a daily basis. Prior to opening, work areas shall be vacuumed at the completion of work within a work area.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

Not used.

-- End of Section --